

CLAIMS

What is claimed is:

1. A process for fabricating a semiconductor device, comprising:
 - 5 applying an immersion lithography medium to a surface of a semiconductor wafer;
 - exposing a material on the surface of the semiconductor wafer to electromagnetic radiation having a selected wavelength; and
 - 10 applying supercritical carbon dioxide to the semiconductor wafer to remove the immersion lithography medium from the surface of the semiconductor wafer.
2. A process as in claim 1 wherein the immersion lithography medium is a fluoropolymer.
- 15 3. A process as in claim 1 wherein the immersion lithography medium is substantially non-reactive with the material forming the surface of the semiconductor wafer and is substantially transparent to the radiation.
- 20 4. A process as in claim 1 wherein the selected wavelength is in a range from about 11 nm to about 400 nm.
5. A process as in claim 1 wherein the selected wavelength is about 157 nm.
- 25 6. A process as in claim 1 wherein the material forming the surface of the semiconductor wafer is photosensitive to the selected wavelength.
7. A process as in claim 1 further comprising, following the step of applying supercritical carbon dioxide to the wafer, obtaining a mixture of the

immersion lithography medium removed from the surface and carbon dioxide and recovering the immersion lithography medium from the mixture.

5 8. A process as in claim 7, wherein recovering includes reducing pressure and/or temperature of the mixture and removing carbon dioxide from the mixture.

9. A process as in claim 1, wherein exposing comprises passing the radiation through the immersion lithography medium.

10 10. A process for fabricating a semiconductor device, comprising: applying an immersion lithography medium to a surface of a semiconductor wafer; exposing a material on the surface of the semiconductor wafer to electromagnetic radiation having a wavelength of about 157 nm, the exposing comprising passing the radiation through the immersion lithography medium; and applying supercritical carbon dioxide to the semiconductor wafer to remove the immersion lithography medium from the surface of the semiconductor wafer.

15 20 11. A process as in claim 10 wherein the immersion lithography medium is a fluoropolymer.

25 12. A process as in claim 10 wherein the immersion lithography medium is substantially non-reactive with the material forming the surface of the semiconductor wafer and is substantially transparent to the radiation.

13. A process as in claim 10 wherein the material forming the surface of the semiconductor wafer is photosensitive to the selected wavelength.

30 14. A process as in claim 10 further comprising, following the step of applying supercritical carbon dioxide to the wafer, obtaining a mixture of the

immersion lithography medium removed from the surface and carbon dioxide and recovering the immersion lithography medium from the mixture.

15. A process as in claim 14, wherein recovering includes reducing
5 pressure and/or temperature of the mixture and removing carbon dioxide from the mixture.

16. A process for fabricating a semiconductor device, comprising:
10 applying an immersion lithography medium to a surface of a semiconductor wafer, wherein the immersion lithography medium is substantially non-reactive with the material forming the surface of the semiconductor wafer and is substantially transparent to the radiation;

15 exposing a material on the surface of the semiconductor wafer to electromagnetic radiation having a wavelength of about 157 nm, the exposing comprising passing the radiation through the immersion lithography medium;

16 applying supercritical carbon dioxide to the semiconductor wafer to remove the immersion lithography medium from the surface of the semiconductor wafer; and

20 obtaining a mixture of the immersion lithography medium removed from the surface and carbon dioxide and recovering the immersion lithography medium from the mixture.

17. A process as in claim 16 wherein the immersion lithography medium is a fluoropolymer.

25 18. A process as in claim 16 wherein the material forming the surface of the semiconductor wafer is photosensitive to the radiation.

30 19. A process as in claim 16, wherein recovering includes reducing pressure and/or temperature of the mixture and removing carbon dioxide from the mixture.

20. A process as in claim 16, wherein the immersion lithography medium recovered from the mixture exhibits substantially the same chemical composition and/or substantially the same purity as the immersion lithography medium applied to a surface of the semiconductor wafer.